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VOCATIONAL TALENT EXERCISES, PART A.

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THIS WORKBOOK WAS DEVELOPED IN A CURRICULUM PROJECT, DESCRIBED IN VT 004 454 TO HELP JUNIOR HIGH SCHOOL STUDENTS LEARN BASIC PRINCIPLES AND CONCEPTS OF MECHANICS AND TECHNOLOGY BY MEANS OF A SERIES OF APTITUDE TRAINING EXERCISES. THE EXERCISES ARE SIMILAR TO APTITUDE TESTS EXCEPT THAT AN EXPLANATION OF THE UNDERLYING PRINCIPLE AND THE CORRECT ANSWERS ARE PROVIDED. IT IS THE FIRST OF FOUR BOOKS WHICH CONTAIN 30 EXERCISES TO BE PRESENTED IN 30 CLASS PERIODS. THE TEXT WAS WRITTEN AT THE SIXTH GRADE LEVEL. THE SIX EXERCISES IN THIS PART COVER ABSTRACT REASONING AND TWO- AND THREE-DIMENSIONAL VISUALIZATION PROBLEMS SIMILAR TO THOSE FOUND ON APTITUDE TESTS. ANSWERS ARE PROVIDED FOR EACH EXERCISE. OTHER RELATED DOCUMENTS ARE VT 004 455 AND VT 004 471. (EM)

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VOCATIONAL TALENT EXERCISES

PART A

The George Washington University
School of Education
Education Research Project
Washington, D.C.
1965

VT004458

INTRODUCTION

Several important talents have been found to be very necessary for success in training for good jobs with a future. How well you do in life may depend on how well you can do on aptitude tests.

This booklet contains practice exercises designed to help you learn to solve problems better. The ability to solve these problems will increase your ability to succeed in important training programs later on.

We hope you will enjoy doing them.

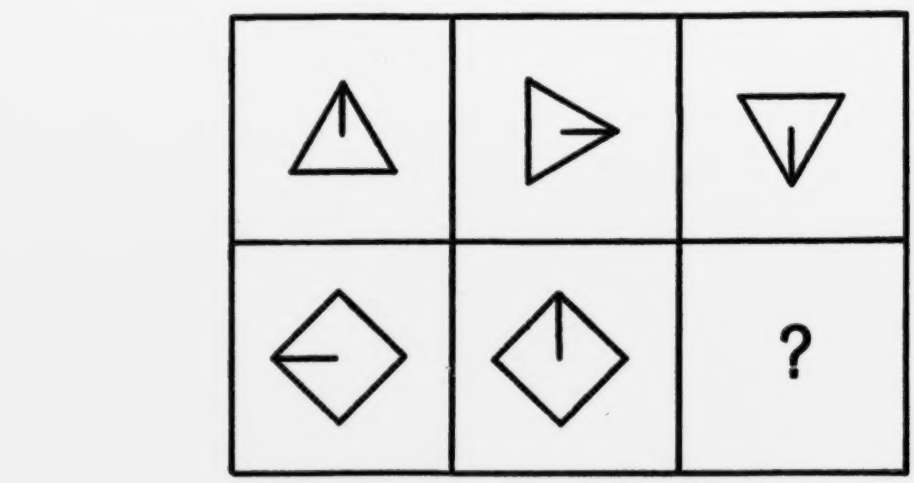
Exercise 1

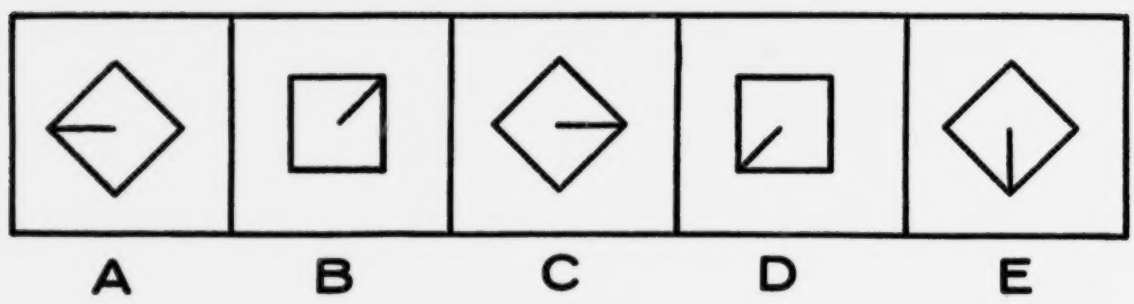
GETTING THE IDEA
(Abstract Reasoning--Part 1)

How does a person learn about the world? One way is by looking for rules which make things work.

In this exercise you will see some drawings. They are like puzzles. You can solve the puzzles by finding the idea or rule behind the drawings.

Look at the top row of boxes below. See how the triangle with the line turns around like the hand of a clock. It starts out at 12 o'clock high, then it moves to 3 o'clock, and then it moves to 6 o'clock.

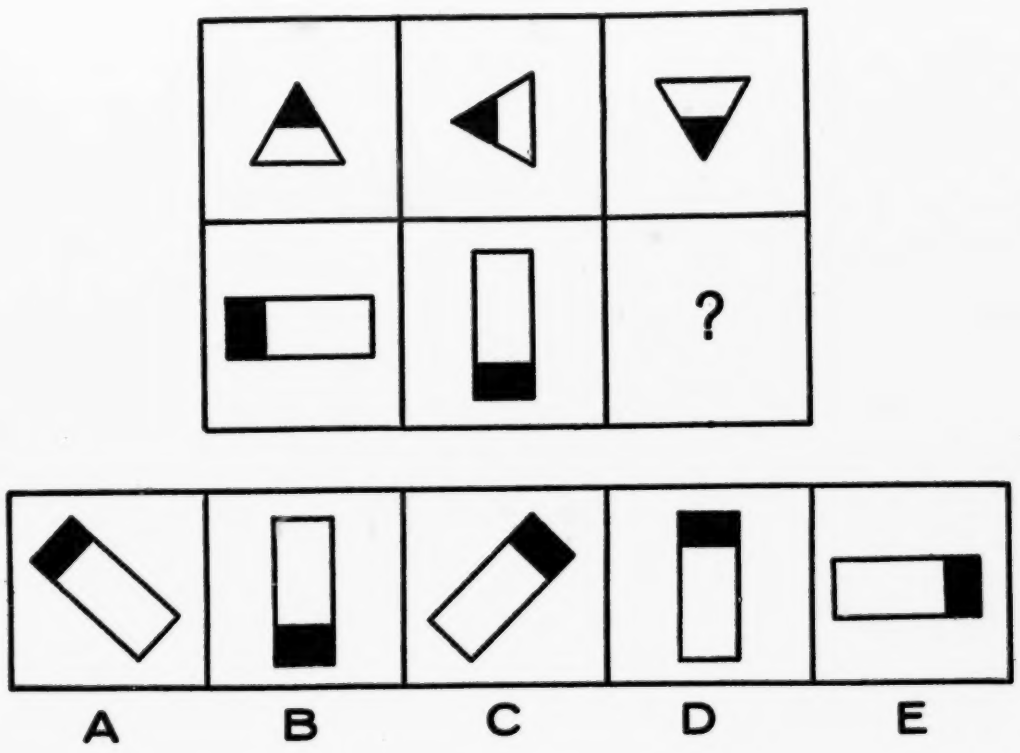




Now look at the second row of boxes. See how the squares turn around just like the triangle did. In the last box you will find a question mark (?). Your job is to figure out what a square in this box should look like. Does it look like the square in box A, B, C, D, or E? Circle the correct answer.

The correct answer is __C__. Why? Because the line in the square tells us the direction the drawings are supposed to turn. In other words, we "get the idea" from the way the triangles and the squares turn.

Let's try another one. Circle the correct answer.



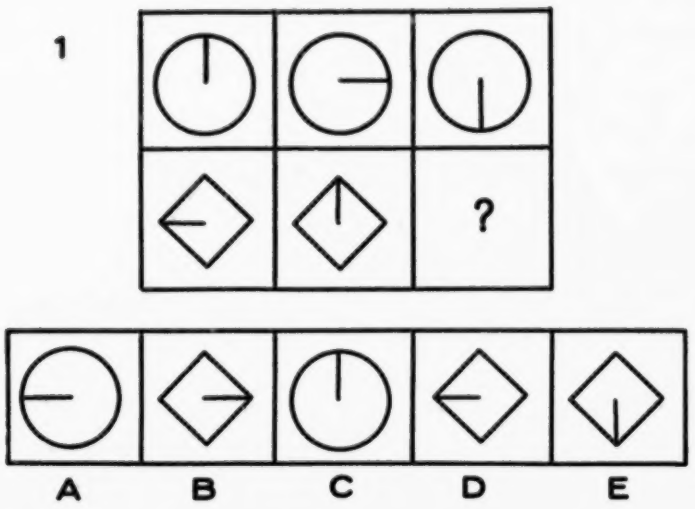
__E__ is the correct answer. In the second row the drawings turn around the same way the drawings in the top row turn. There is only one correct answer. It has to be __E__.

Drill 1

On this page is a set of four items like the ones we have been working with.

Now try solving them. Circle the letter under the correct answer.

1



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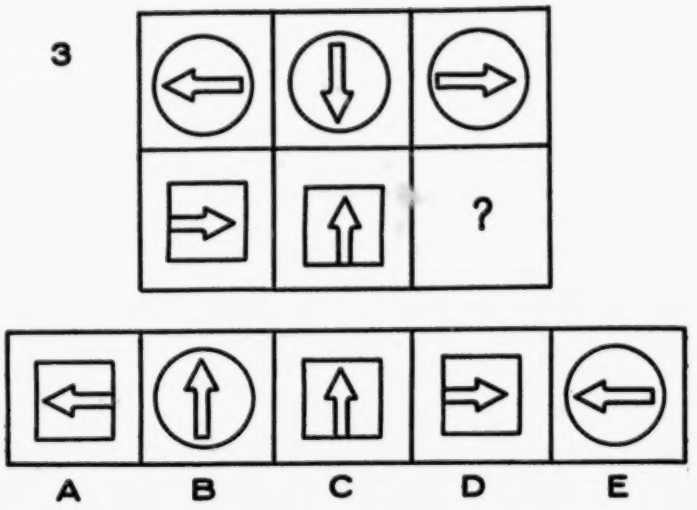

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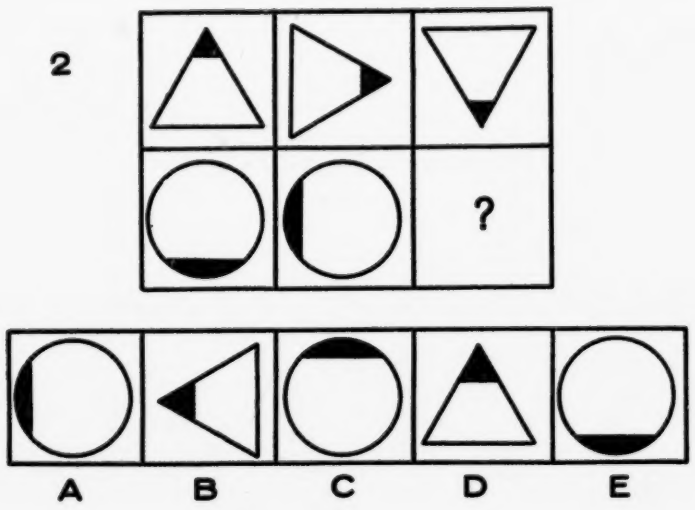

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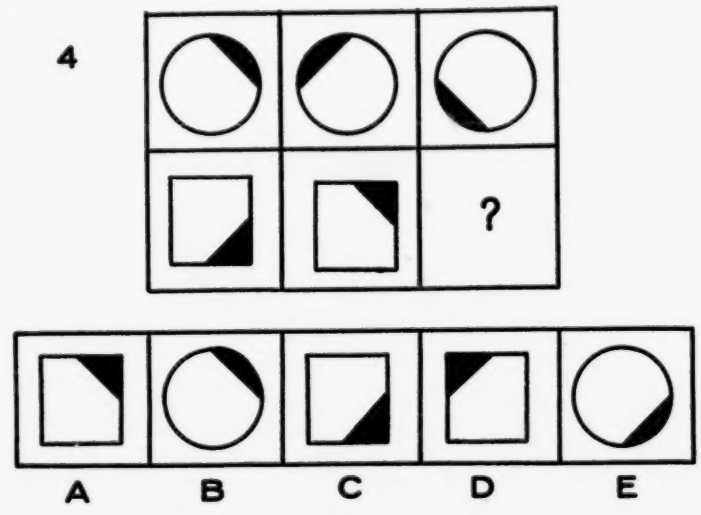
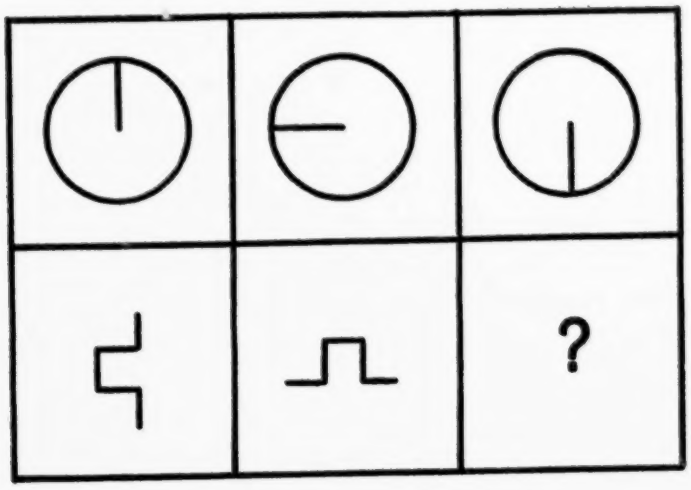
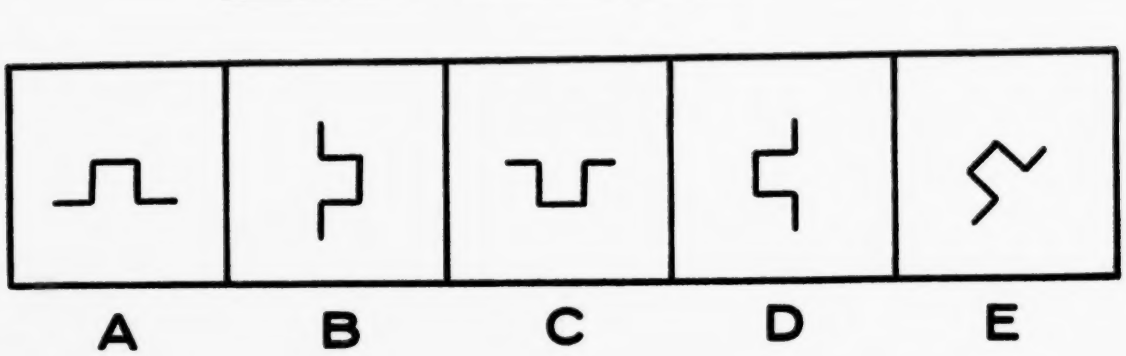


No.	Ans.	Reason
1.	B	Notice that the drawings in both rows turn clockwise the same amount.
2.	C	Notice that the drawings in both rows turn clockwise the same amount.
3.	A	The figures in both rows turn counterclockwise the same amount.
4.	D	This is a little harder. Notice that the figures in both rows turn counterclockwise the same amount.

The next drill has problems like the one you just did except that the drawings in the second row turn in the opposite direction from the ones in the top row.

Drill 2 is made up of puzzles like this one:





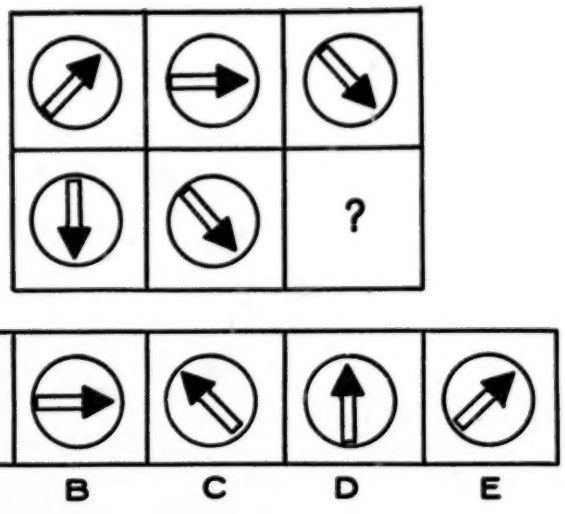
In this example __B__ is correct because the drawings in the second row are turning the opposite way from the drawings in the top row.

Now go on to Drill 2. Be careful, though, because sometimes the figures in the top row turn one way and sometimes the other.

Drill 2

Here are four more problems. Be sure to watch which way the figures turn.

5



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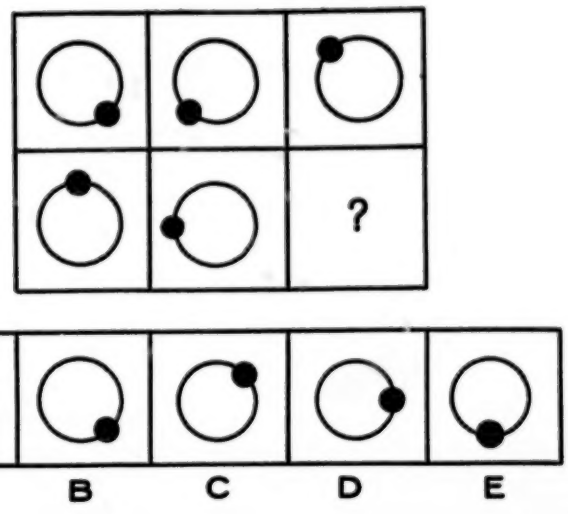

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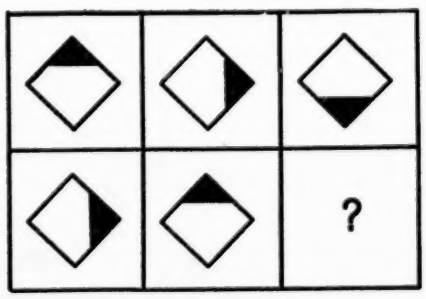

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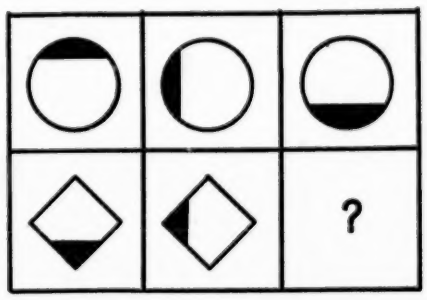


No.	Ans.	Reason
5.	B	The figures in the first row are turning clockwise, while the ones in the second row are turning counterclockwise.
6.	E	The figures in the first row are turning clockwise. The ones in the second row are turning counterclockwise.
7.	E	Pick the figure that has turned counterclockwise the same amount that the figures in the first row have turned clockwise.
8.	C	The circular figures are turning counterclockwise, while the diamond-shaped ones are turning clockwise.

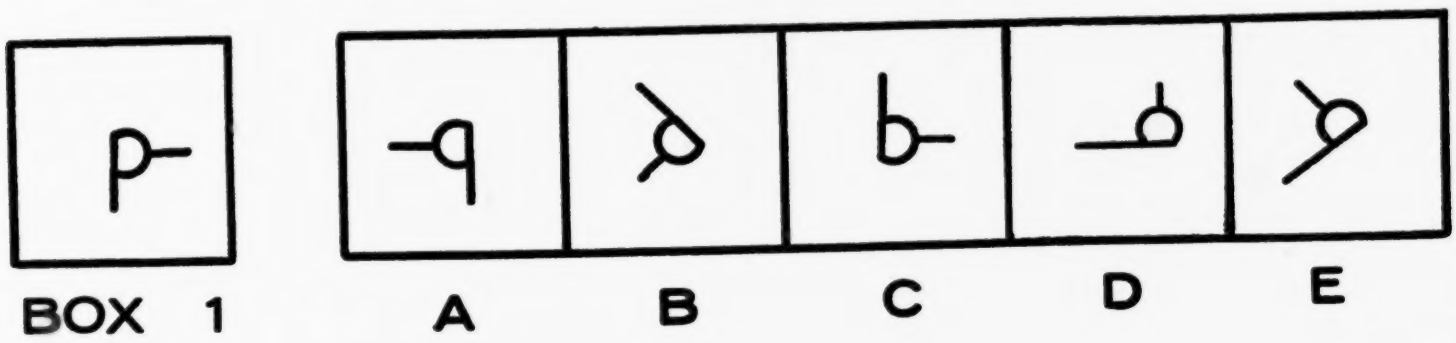
Exercise 2

SEEING THINGS IN TWO DIMENSIONS
(2-D Visualization--Part 1)

Have you ever been lost because you went somewhere from a different place or direction? You saw the same buildings and the same streets. But you saw them from a different place, and they looked different. When things are turned around, they look different.

Put your hand on the table with your thumb out. It will look like an L. Now turn it around a little, and it will look like a V. It is the same thing, but it looks different. In this part of the book you will learn to see how things look different when they have been moved.

Look at box 1 with the drawing of a figure inside it. Imagine that the figure is made out of black wire and put on a white table. Now, suppose you turn the wire around with your hand any way you want as long as you don't pick it up and flip it over. Would it look like the figure in box A, B, C, D, or E?



The right answer is __B__. Put a circle around B, because that is the only one that looks like box A when it is turned around. To make it look like the other boxes you have to pick it up and flip it over on its back, and that is against the rules.

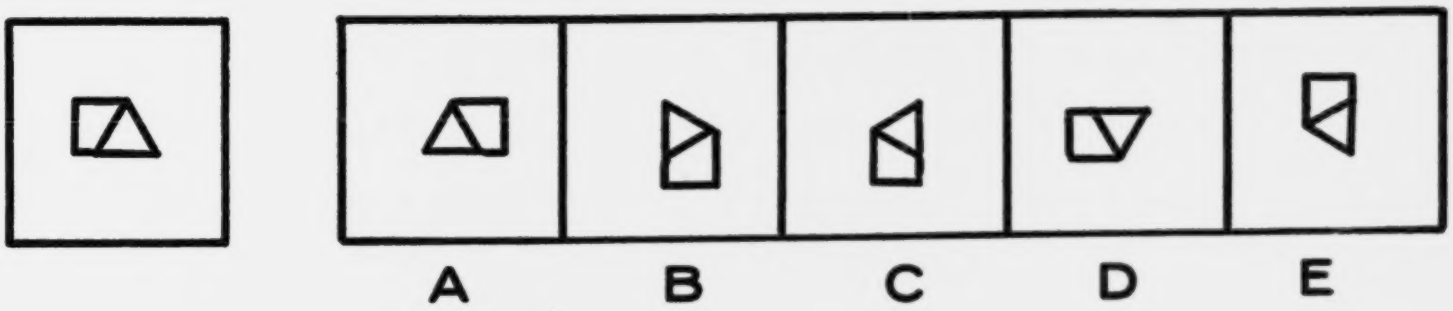
Now, close your eyes and try to see the figure in box A turned around so it looks like box B.

Look at boxes A, C, D, and E. They look like box B but they are backwards. They are flipped over. They are wrong.

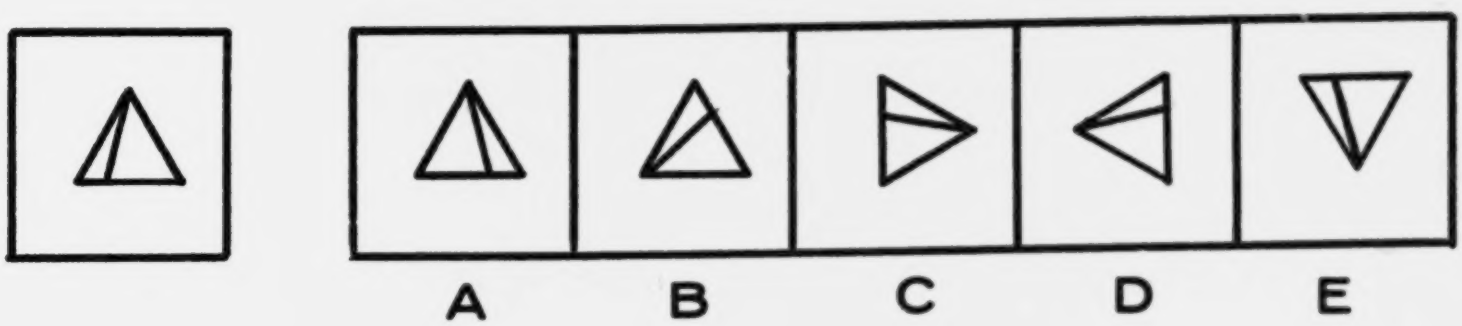
Now, close your eyes again and try to see the figure in box A flipped over so that it looks like the figures that are backwards.

We call this seeing *how things move in our minds* without touching them. Your job will be to put a circle around the one that is turned around. It is the correct one. The ones that look backwards are wrong because they are flipped over. You can find the answer by _____ the figure. turning
(fill in the word)

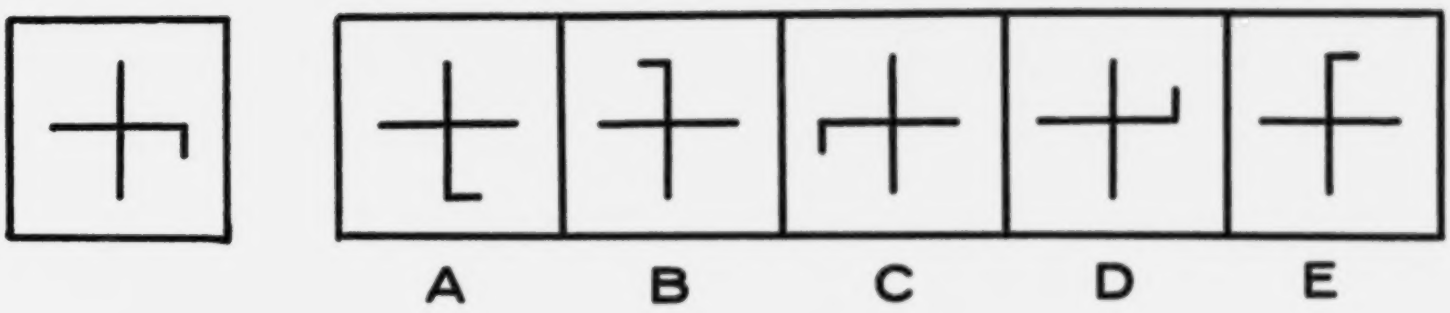
Try the ones below to see if you know the "turning rule."



__C__ is the answer. You get __C__ by turning the figure in box C around without flipping it over.



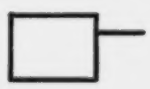
__C__ is the answer. The other figures are wrong because it's against the rule to _____ flip the drawing on its back.



__E__ is the answer. You have to _____ turn the figure around to get the answer.

Would you like to improve your memory? Do you have trouble seeing the drawings move around in your mind? Try this. Think of what the figure looks like. This one:

looks like a flag. The next one:



looks something like a cup. The job we're doing is easy if you think of something the figure _____ looks like.

Drill 1

Here are 10 items to do. Some are easy--some are hard. Circle the one you think is correct. There is no time limit.

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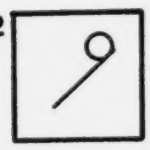
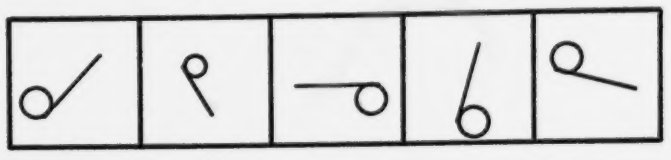
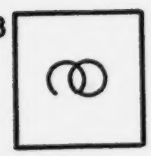
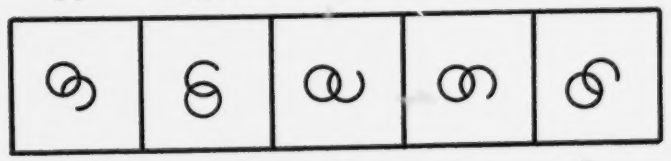
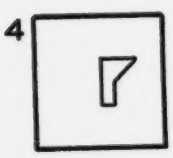
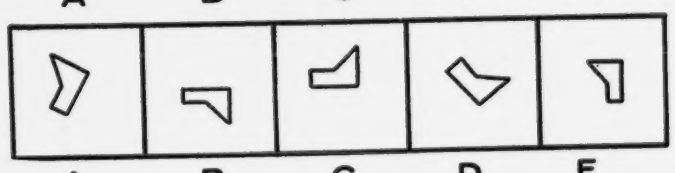
2 



3 



4 



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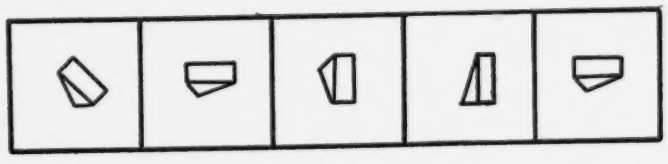
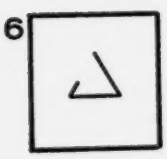
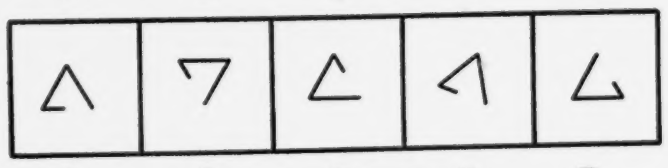


6 



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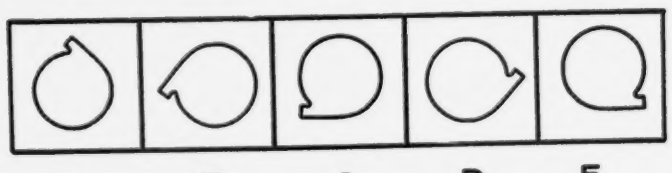
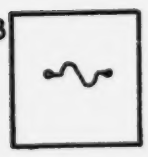
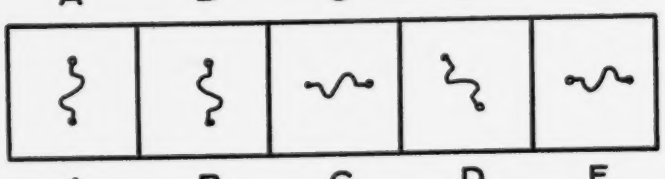


8 



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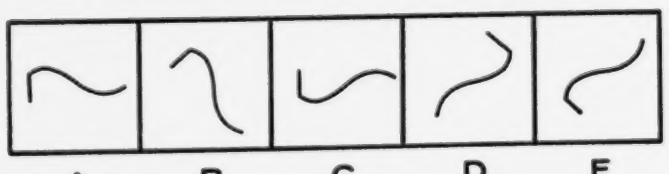
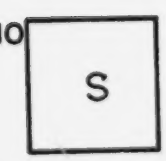
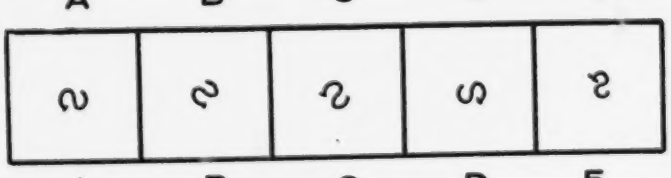


10 



KEY

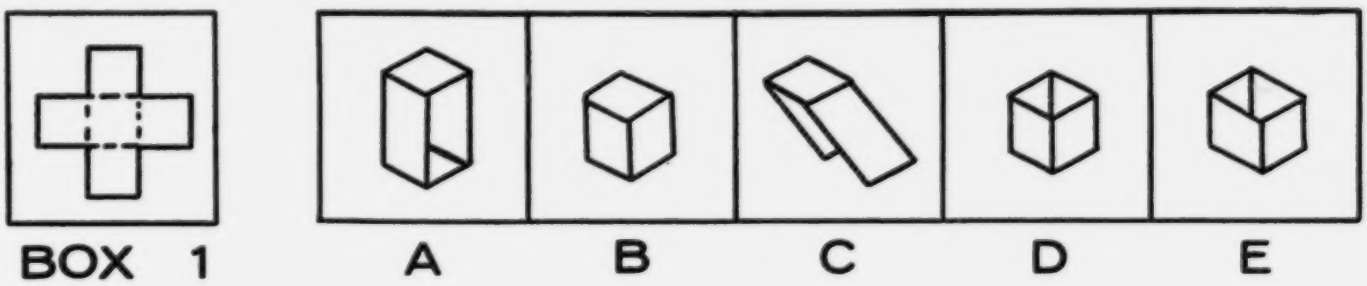
1. B
2. D
3. C
4. B
5. A
6. C
7. C
8. A
9. C
10. D

Exercise 3

SEEING THINGS IN THREE DIMENSIONS
(3-D Visualization--Part 1)

Did you ever wonder how a house builler can take a set of blueprints and "see in his mind" how a house will look when it is built? One of the reasons he can do this is that he has had practice seeing things in three dimensions (3-D). When something has three dimensions, it is not flat, but has height, width, and depth.

Here are some practice exercises which will help you do what the builder does. Look at the figure in box 1 at the left below. It looks like a cross.



When you fold the figure in box 1 at the dotted lines, does the result look like A, B, C, D, or E?

The correct answer is __D__.

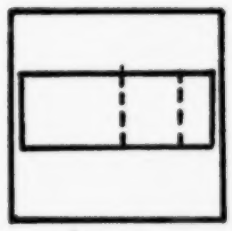
To make the figure in box 1 look like the one in box D, pretend you are folding the paper -- first fold up one piece, then fold another, until all the dotted lines are folded.

If you have trouble keeping the pictures in your mind, try to find something the drawing reminds you of, then pretend you are making it.

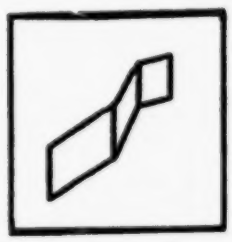
For example, imagine the figure in box D is a house without a roof and the four sides are the walls. If you were standing in the house and pushed the walls down, what would it look like? It would look like a cross.

Let's try another one.

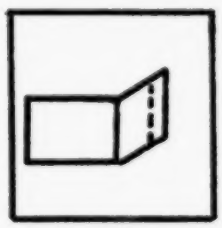
This drawing shows a piece of paper with dotted lines:



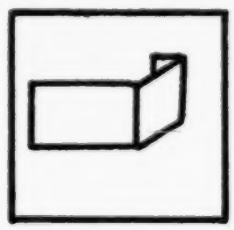
This drawing shows how it looks if you fold it correctly:



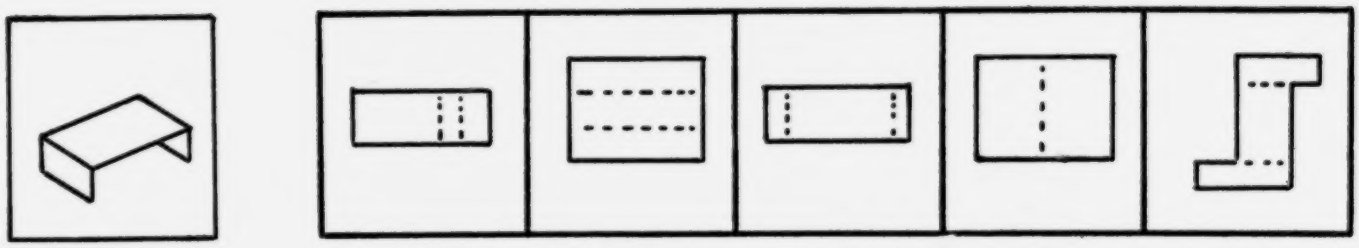
To make the first drawing look like the second one, you first fold the biggest piece. This will make it look like this drawing:



You still have one more fold to make. It can bend two ways -- to the right or to the left. Get a picture of both ways in your mind. If you fold it to the right, you will make it look like the correct drawing. This is what it will look like if you bend it to the left:



Here is another one to practice on. When the figure in box 3 is squashed flat, it looks like the figure in box A, B, C, D, or E. Circle the correct answer.

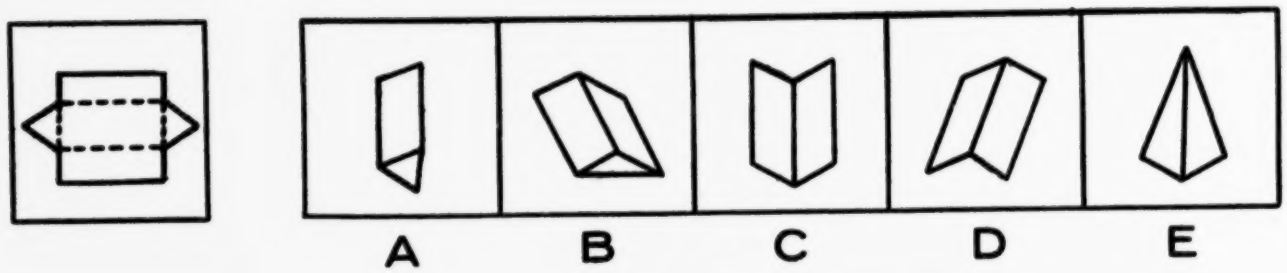


The correct answer is C .

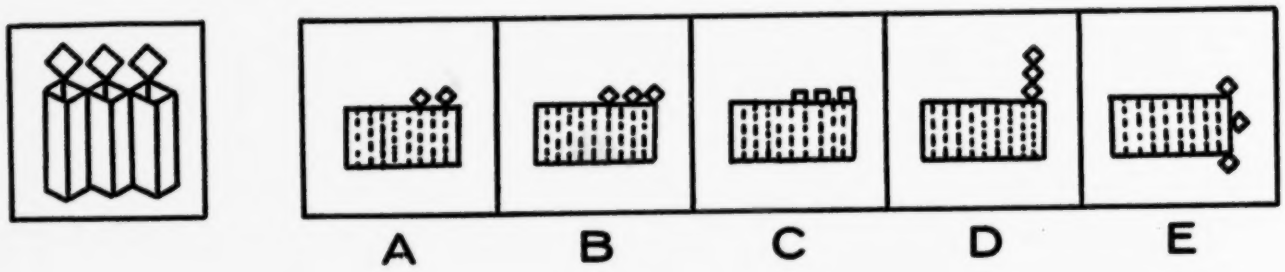
How do you do this in your head? First you make a picture of the table in your mind, and then imagine squashing the table flat with your hands. Another way to imagine it is to pick up the table and turn it over on its back, and then bend the sides out until they are flat like the table top.

On the next pages are some more examples of this type of problem. See if you can do them. Circle the right answer.

1



2



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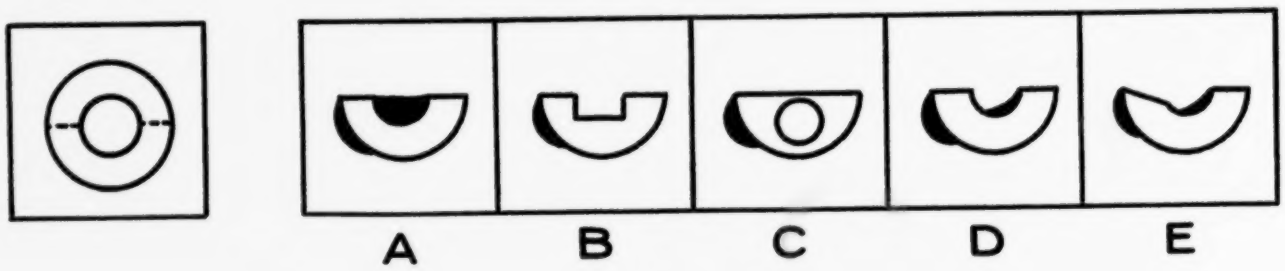

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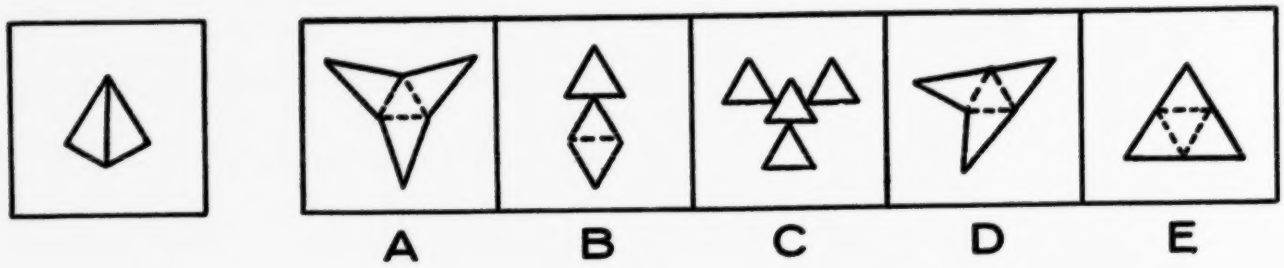

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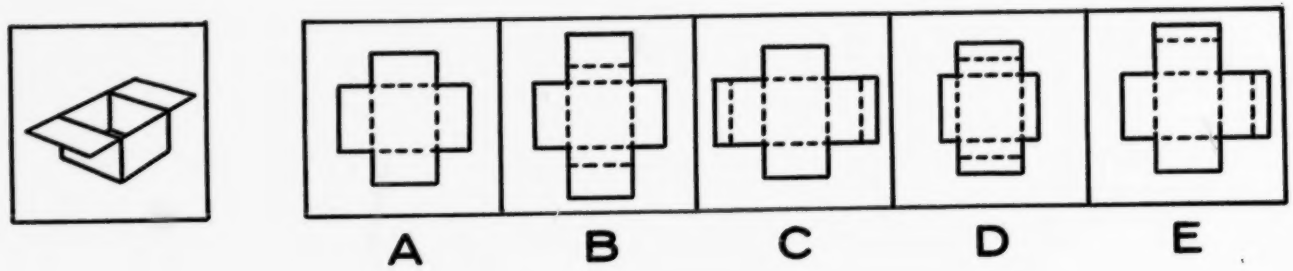

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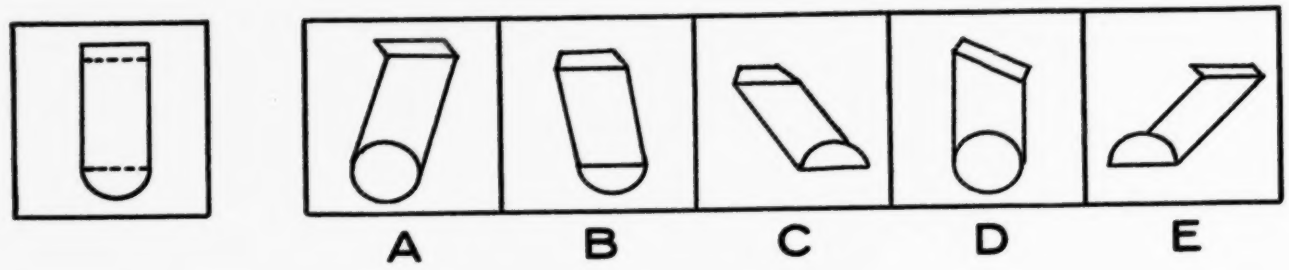
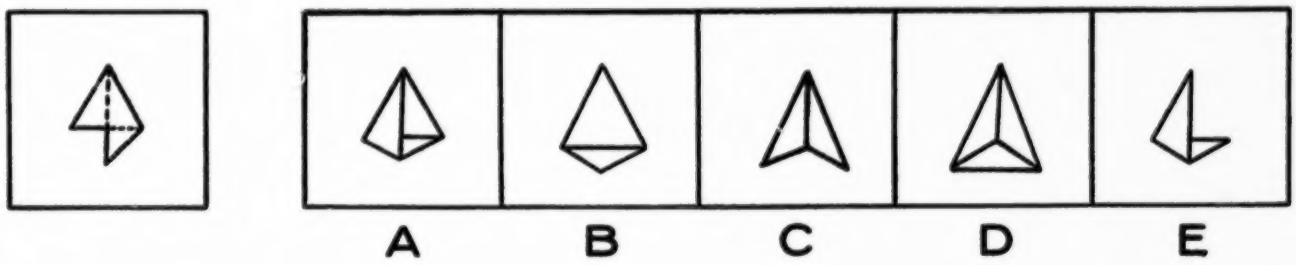


7



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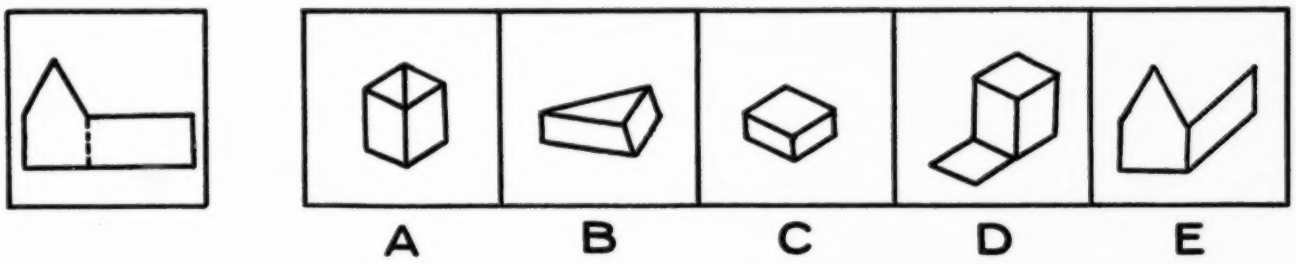

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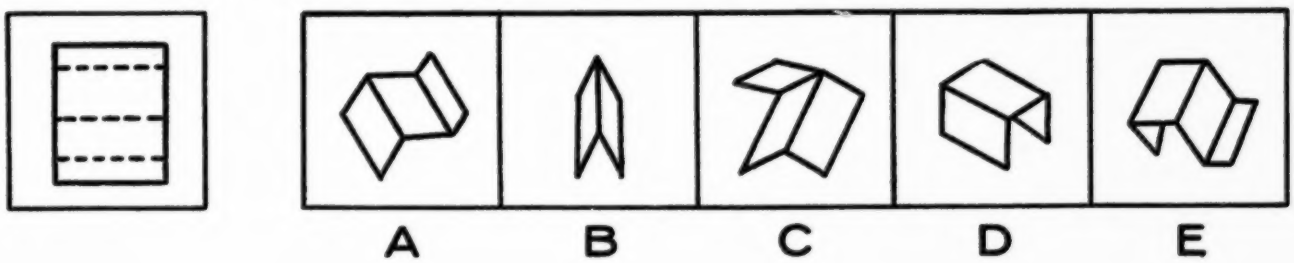
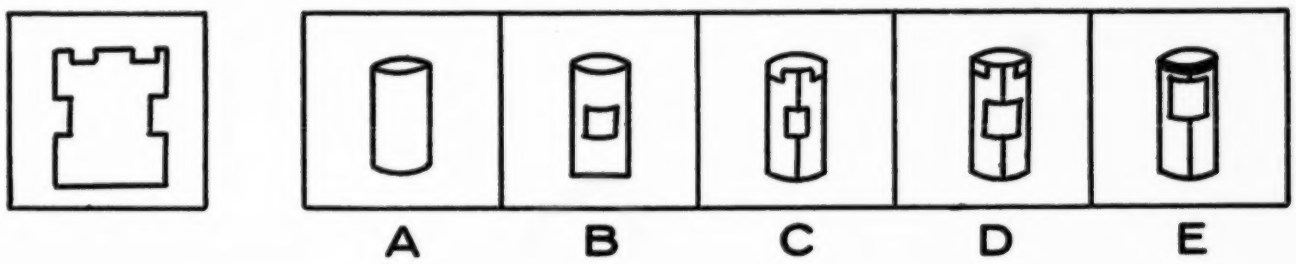


10



KEY

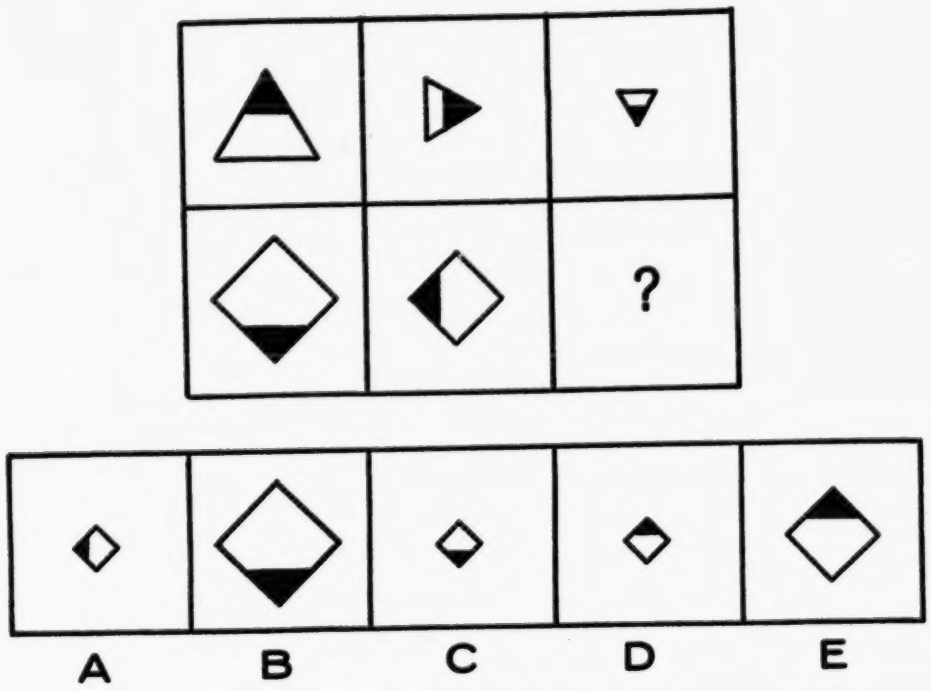
1. A	6. E
2. B	7. A
3. D	8. E
4. A	9. E
5. D	10. C

Exercise 4

GETTING THE IDEA
(Abstract Reasoning--Part 2)

In Exercise 1 you learned to solve problems by observing how figures turned. Go back, review the instructions, and try the exercises again.

Next, look at the example below. Notice that the figures in both rows are turning clockwise. Also, the figures are decreasing in size from left to right. Now look at the choices of answers and circle the letter under the correct one.

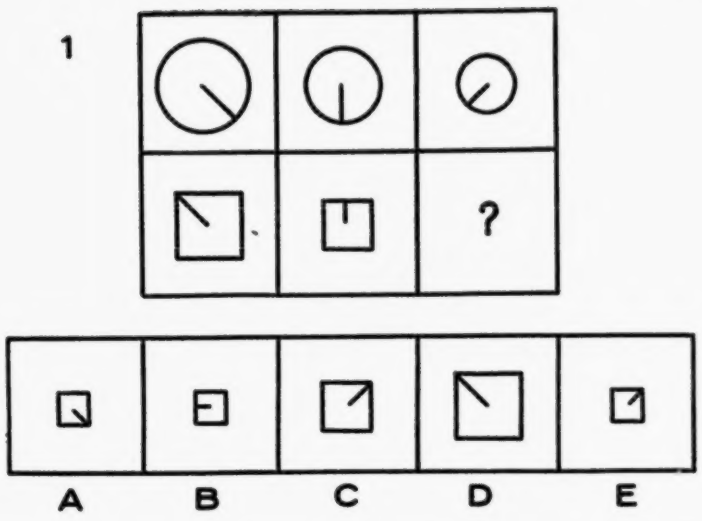


From the way the figures are turning, you know the correct figure must be pointing upward. This means that either D or E is correct. Therefore, __D__ must be the right answer as it is the smallest one.

Now try some problems like this.

Drill No. 1

1



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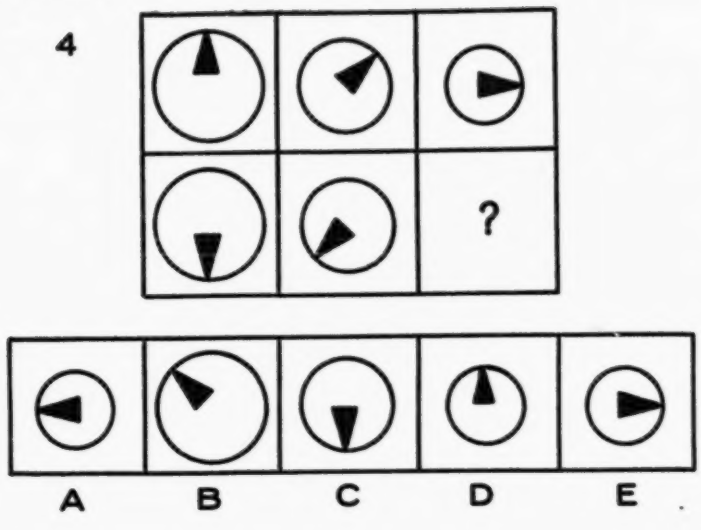
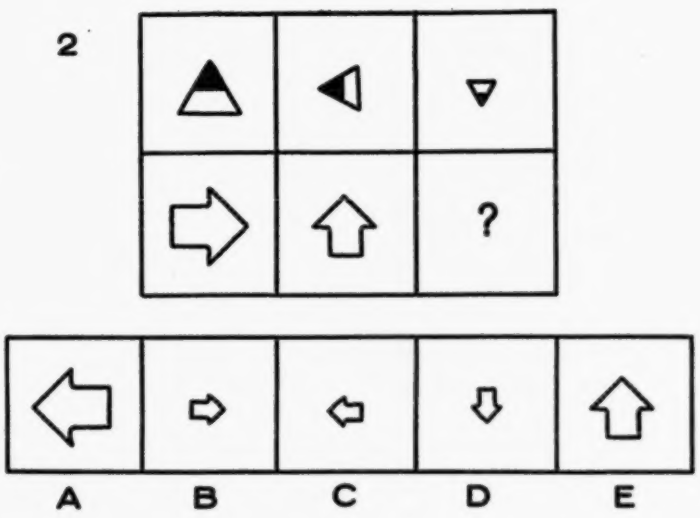
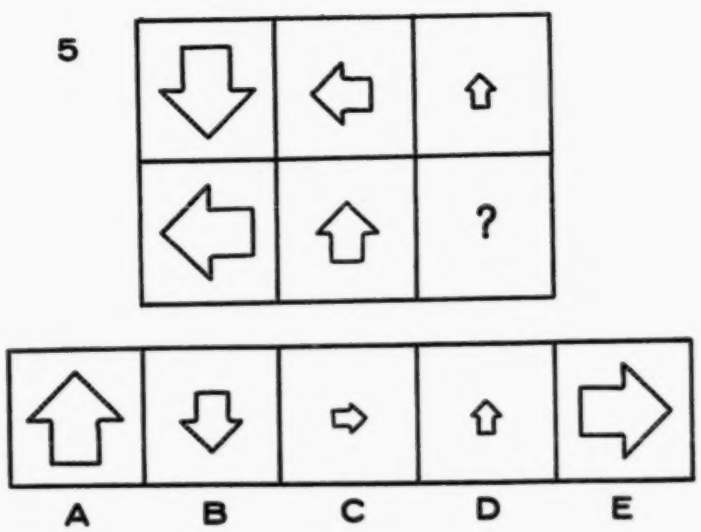


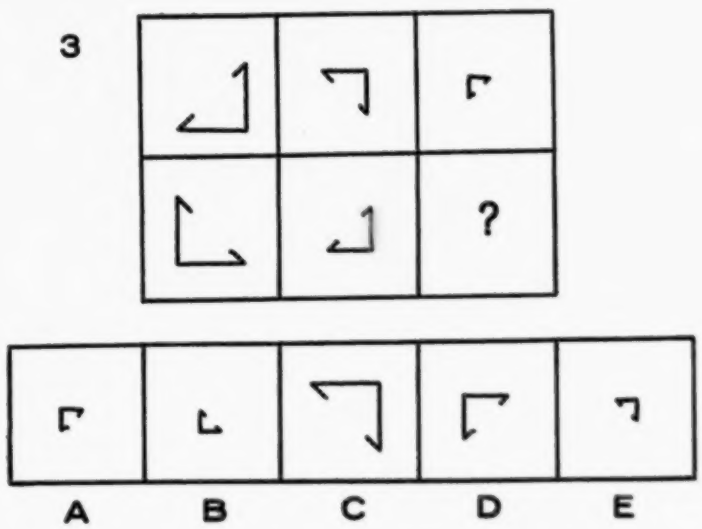
2



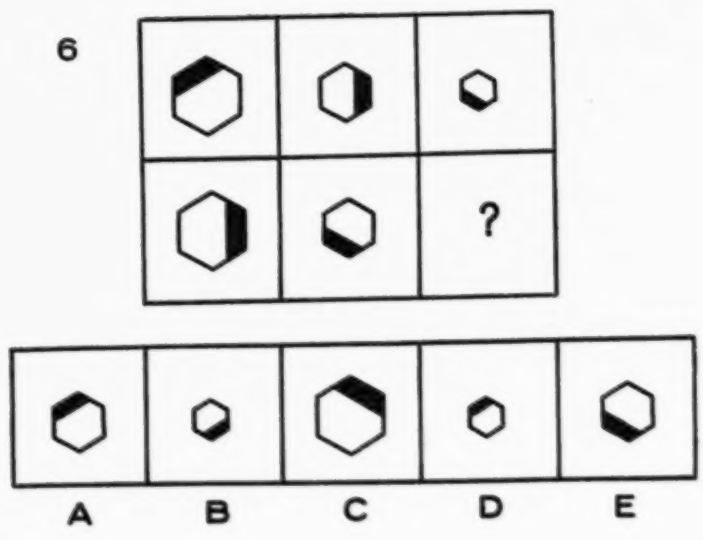
5



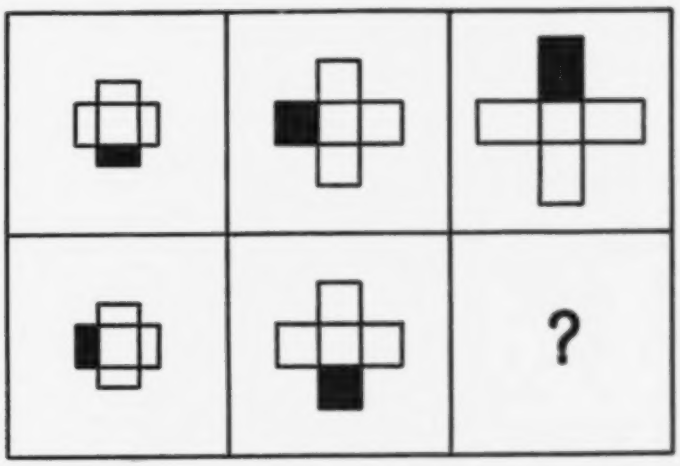
3

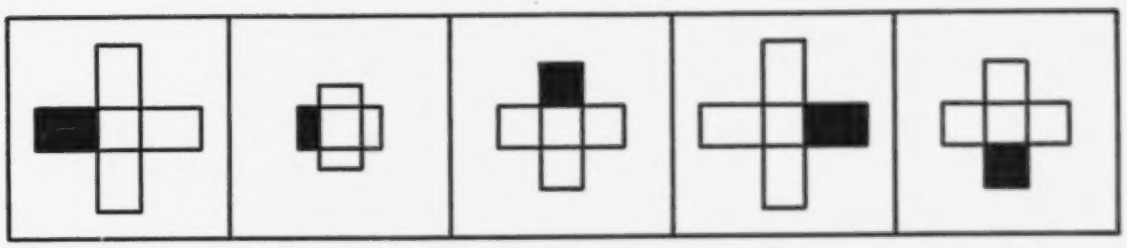


6



This next drill will show how the rules you have already learned can be combined and used in different ways. Instead of the figures getting smaller from left to right, they get bigger, and the second row of figures turn in the opposite direction from the top row.



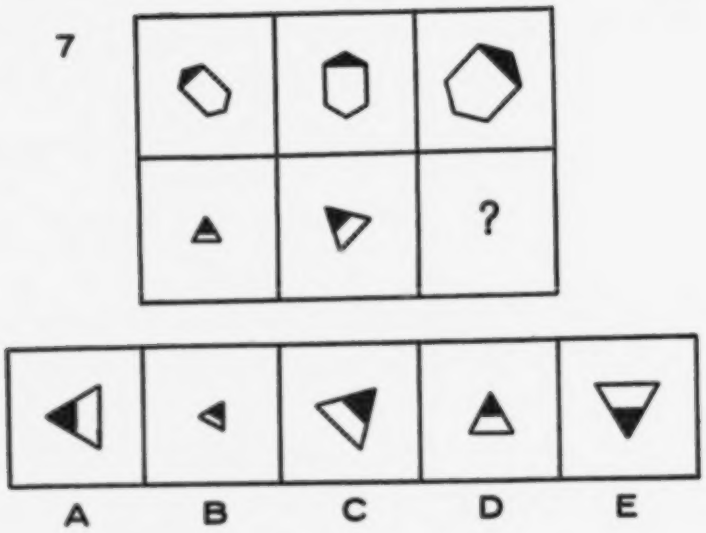


The figures in the top row turn clockwise and get larger from left to right. The figures in the second row turn counterclockwise and increase in size from left to right. The answer is __D__, because it has turned the correct amount counterclockwise and has increased to the right size.

Now try the problems in Drill 2.

Drill No. 2

7



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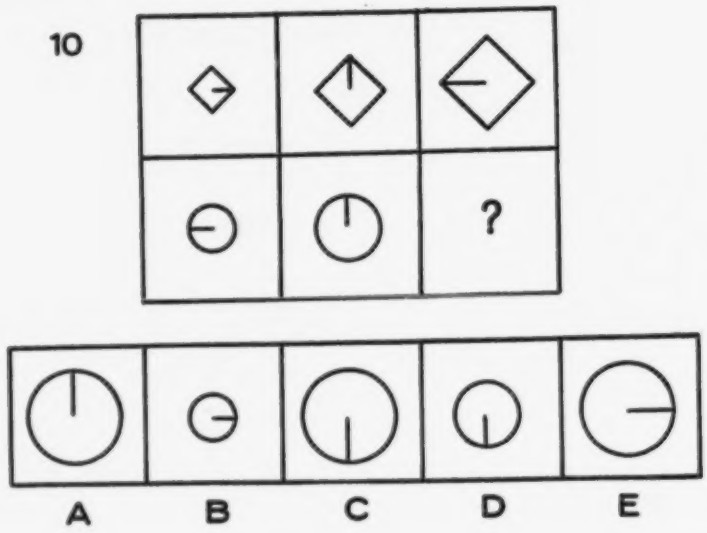

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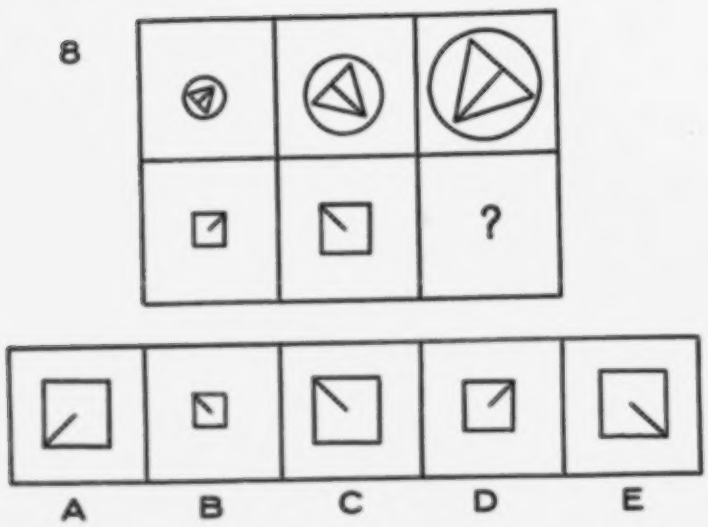

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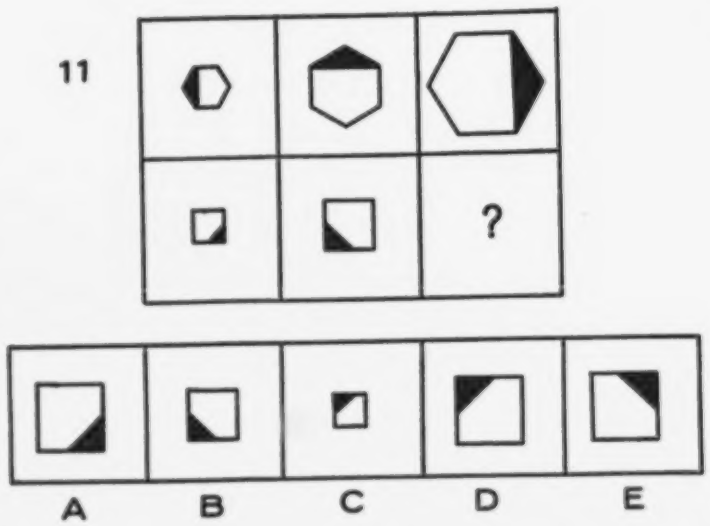

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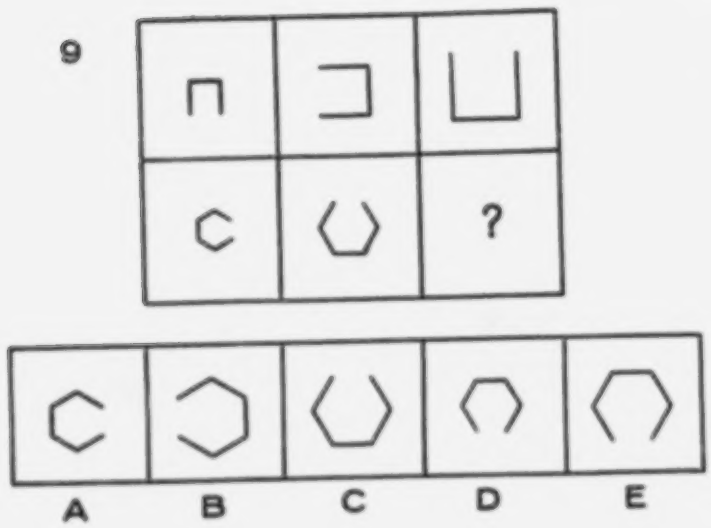

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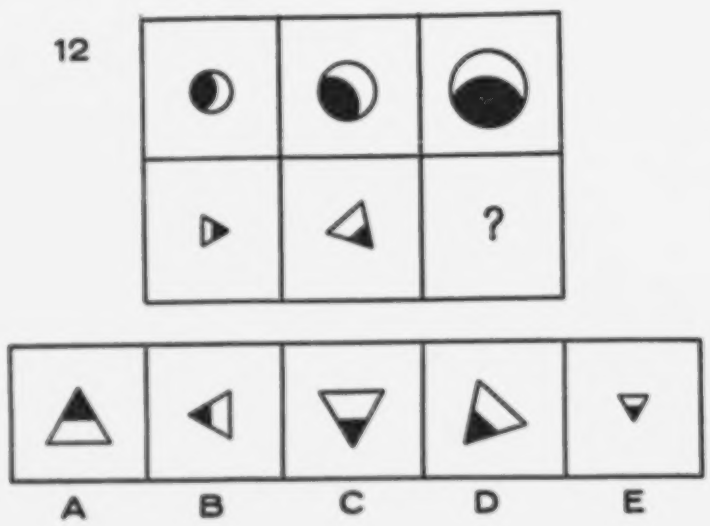
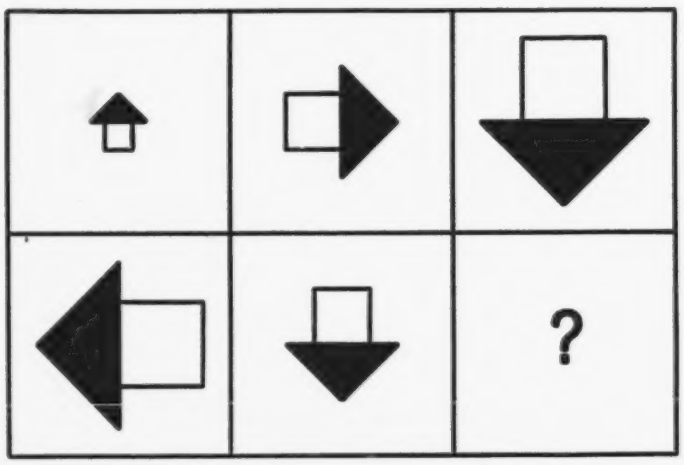
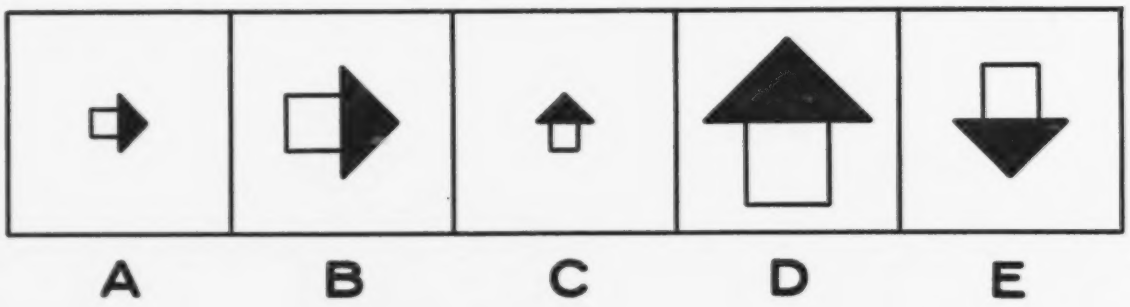


The next drill will combine the rules of rotation and size in different ways than before.

In the example below you will notice that the figures in the top row increase in size and turn clockwise. In the second row the figures get smaller and are turning counterclockwise.

Now look at the choice of answers and then circle the correct one in the example below.

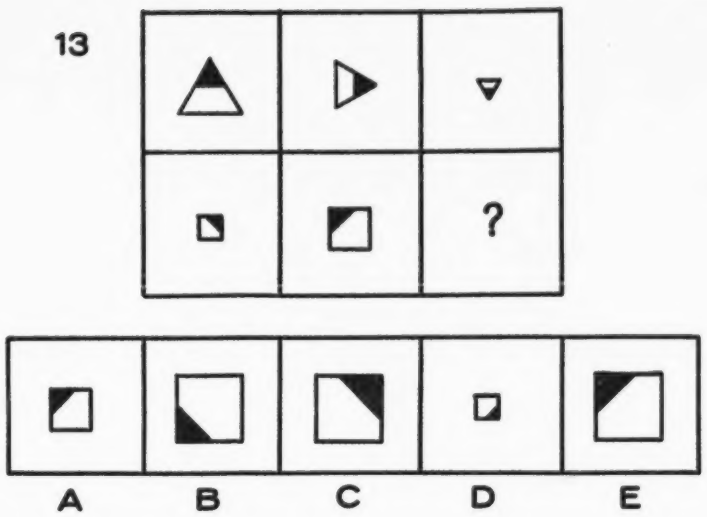




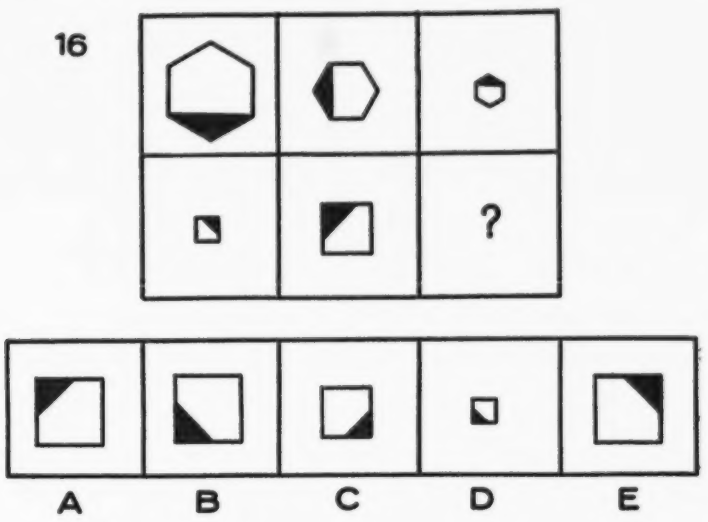
The answer is __A__. The top row of figures shows us how the figures turn. The figures in the second row must move the same amount, but we must be careful to watch the direction in which the second row of figures turn and note whether the figures are getting larger or smaller.

Drill No. 3

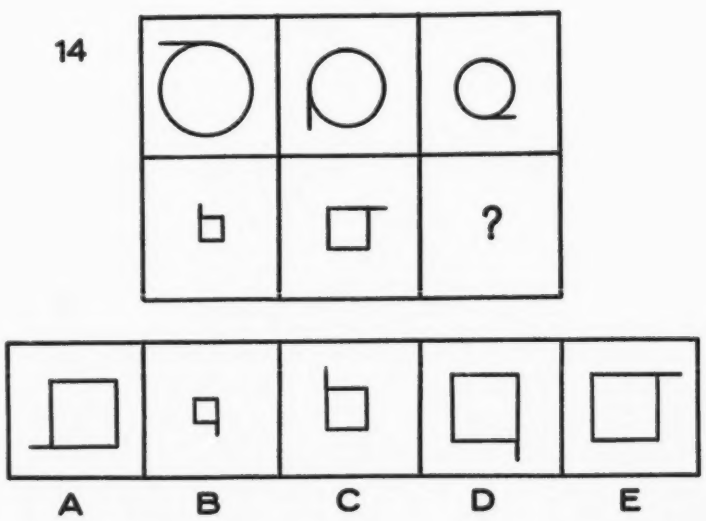
13



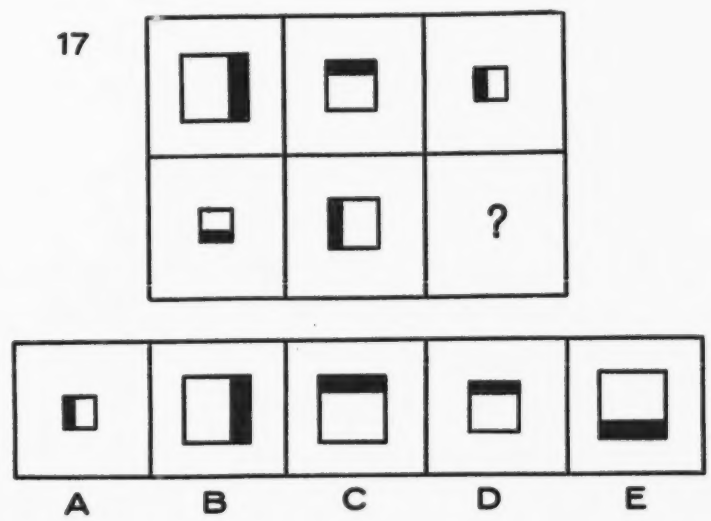
16



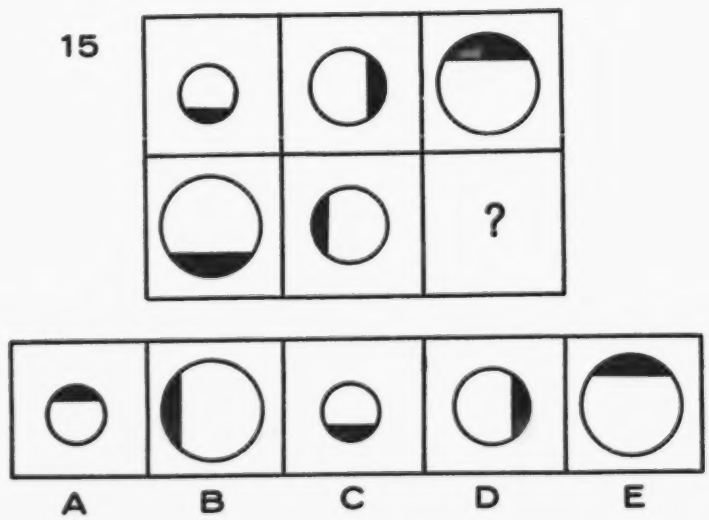
14



17



15



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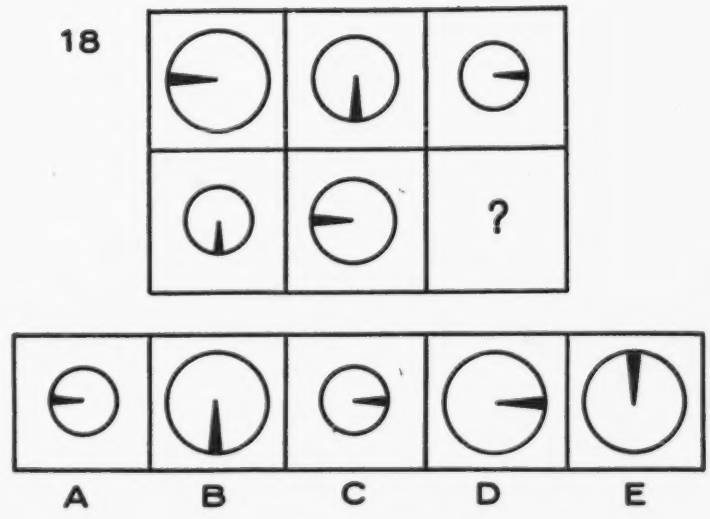


ANSWERS AND EXPLANATIONS

Drill No. 1 (page 4-2)

The figures are decreasing in size and both rows are turning in the same directions.

1. E	2. C	3. E
4. A	5. C	6. D

Drill No. 2 (page 4-4)

The figures are increasing in size from left to right and the figures in the second row are turning in the opposite direction from the top row.

7. A	8. A	9. B
10. E	11. D	12. C

Drill No. 3 (page 4-6)

Notice that in each case the figures in one row increase in size while the figures in the other row decrease. Also one row turns clockwise and the other row turns counterclockwise.

13. B	14. D	15. A
16. B	17. C	18. E

Exercise 5

SEEING THINGS IN TWO DIMENSIONS
(2-D Visualization--Part 2)

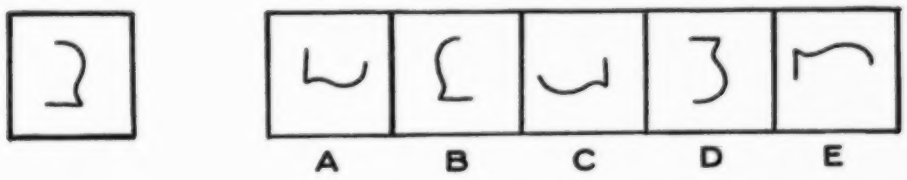
This is similar to Exercise 2, where you learned how to see things in two dimensions. You were shown how to turn a figure around in your mind, until it looked like the correct answer.

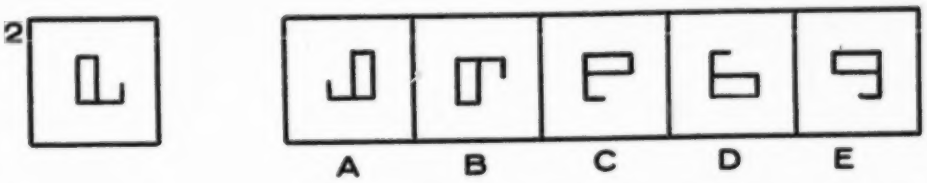
Turn back to Exercise 2, read the instructions, and try the exercises again. When your teacher tells you, turn to the next page and try the new items.

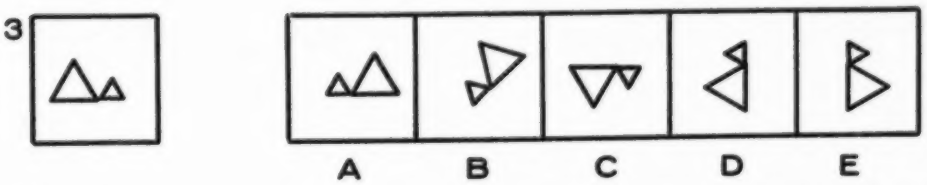
Drill 1.

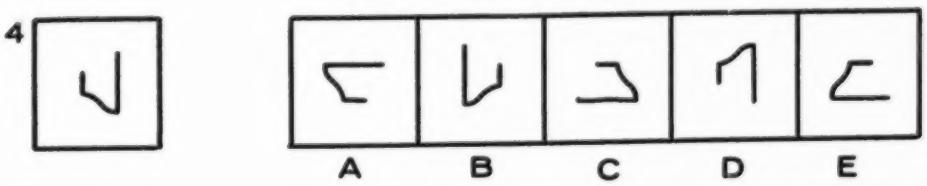
Here are 10 items to do. Some are easy -- some are hard.

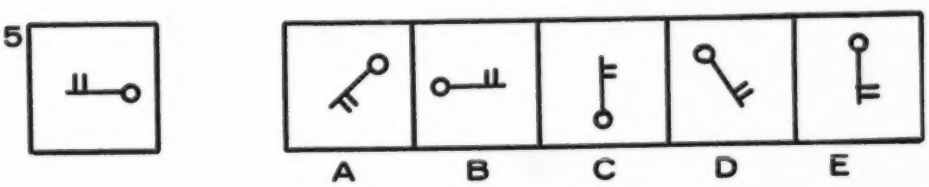
Circle the one you think is correct. There is no time limit.

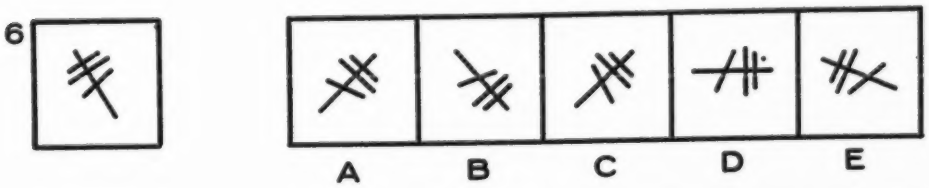
1 

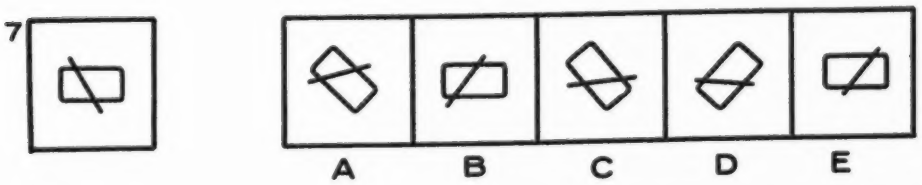
2 

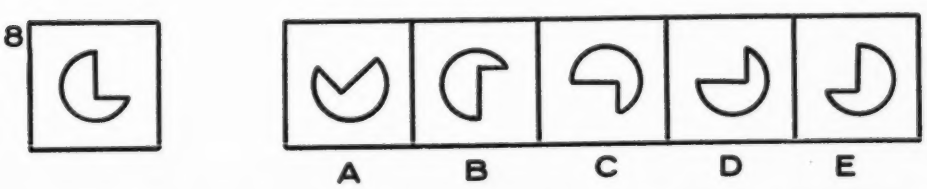
3 

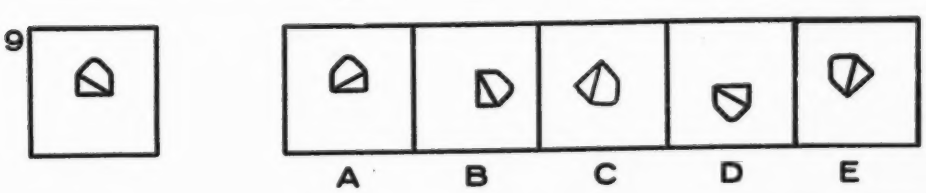
4 

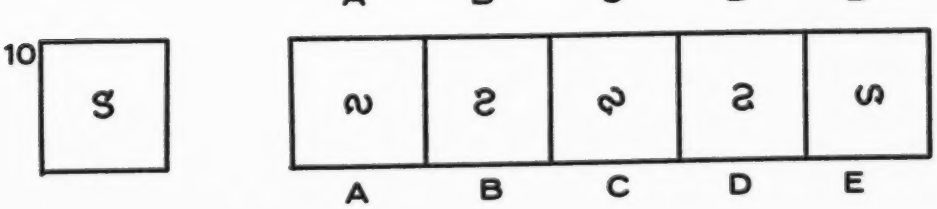
5 

6 

7 

8 

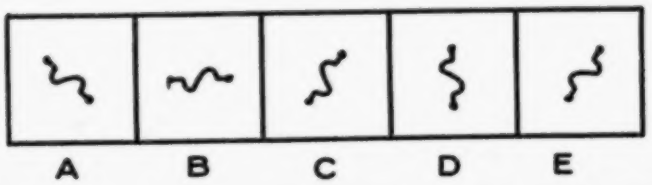
9 

10 

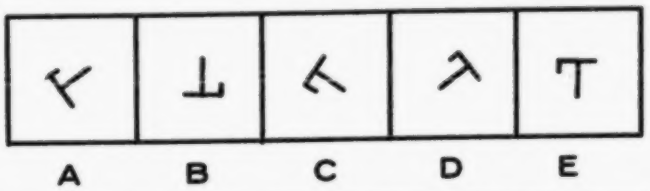
Drill 2.

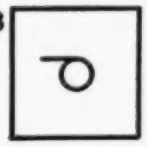
Here are 10 more items to do. Circle the one you think is correct.

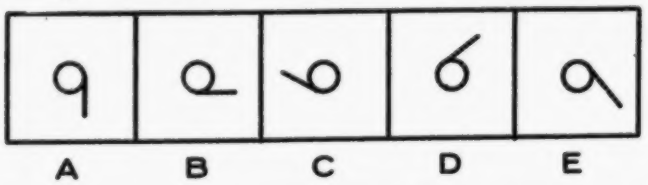
1

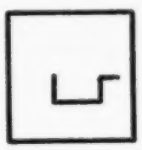


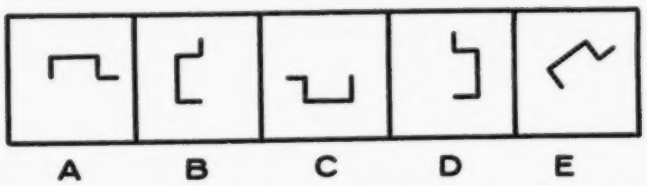
2

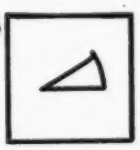


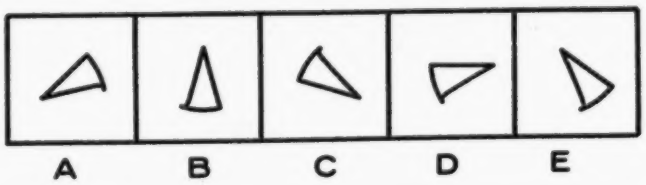
3 



4 



5 



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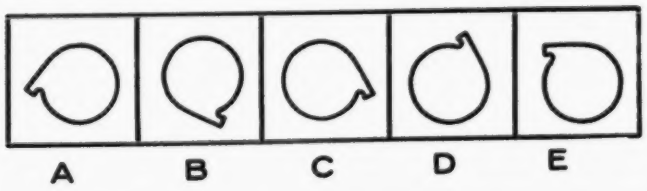

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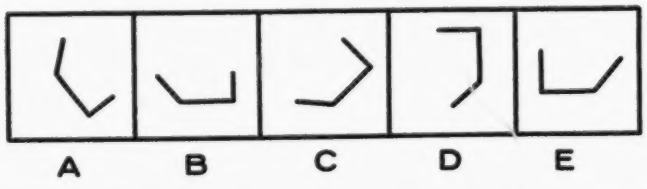
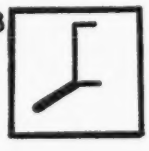
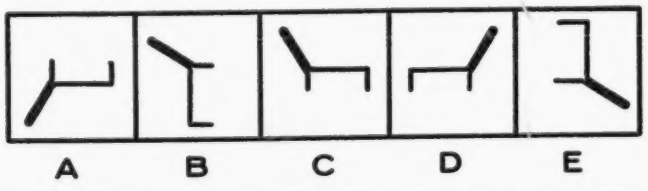


8 



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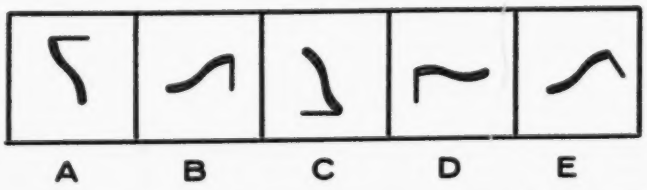
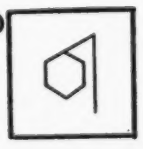
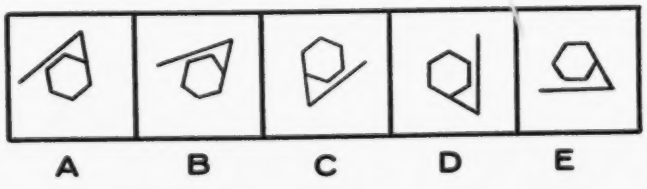


10 



On this page are the correct answers. Count up the number you marked correctly for Drills 1 and 2 and put the numbers here: _____ Drill 1 _____ Drill 2

Did you get more right the second time? Practice may not make perfect, but it helps.

Drill 1	
1.	A
2.	C
3.	D
4.	E
5.	C
6.	A
7.	D
8.	D
9.	D
10.	E

Drill 2	
1.	E
2.	A
3.	B
4.	D
5.	D
6.	C
7.	E
8.	C
9.	D
10.	E

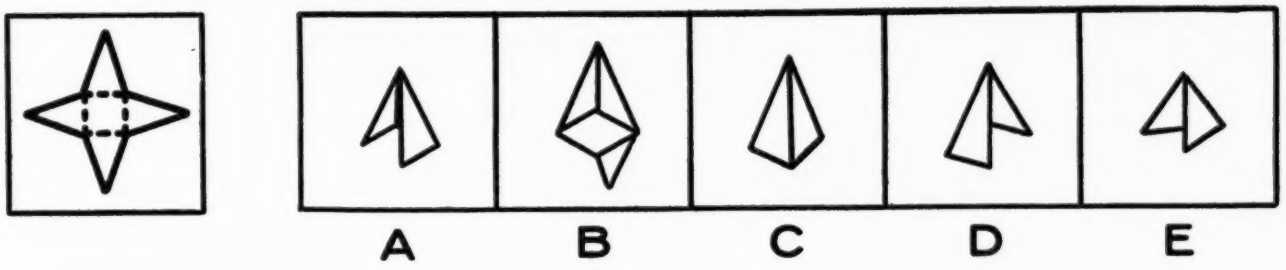
Exercise 6

SEEING THINGS IN THREE DIMENSIONS
(3-D Visualization--Part 2)

This is a continuation of Exercise 3, where you learned how to see things in three dimensions.

Turn back to Exercise 3, review the instructions, and try the exercises again. When your teacher tells you, turn to the next page and see how well you do on a new drill.

1



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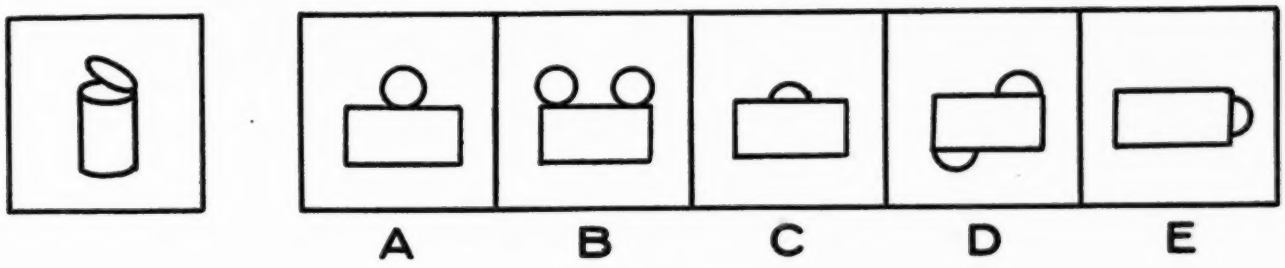

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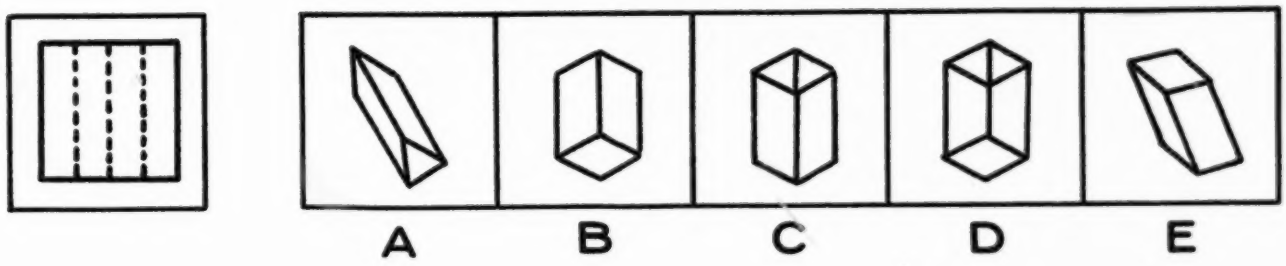

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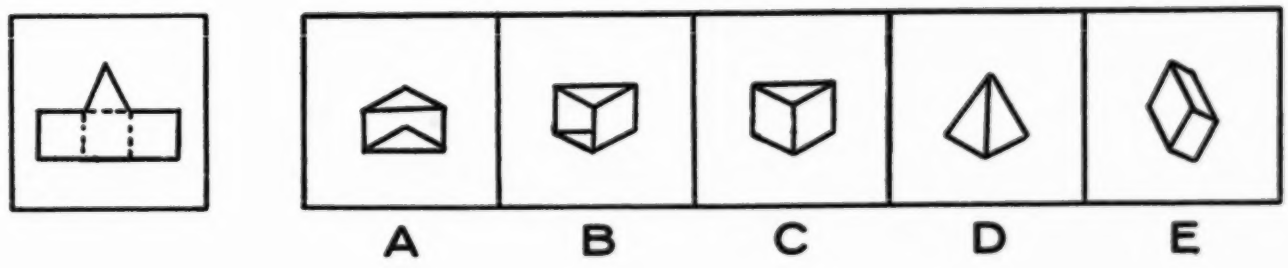

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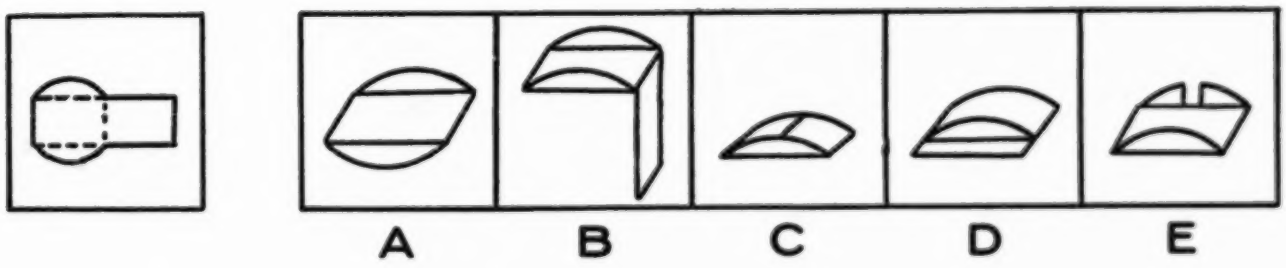

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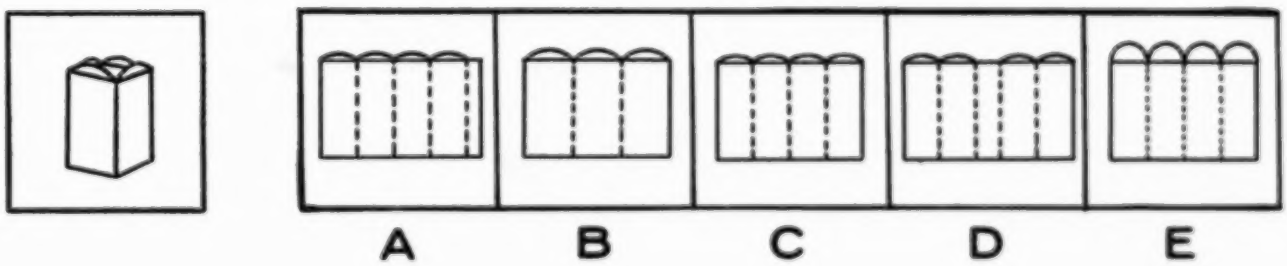

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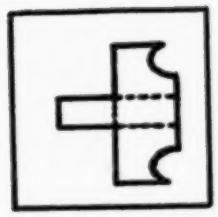

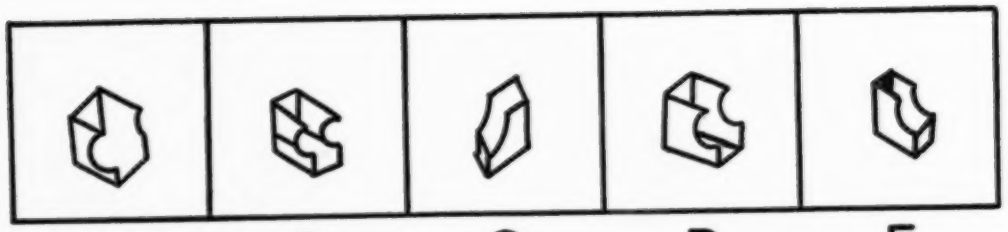

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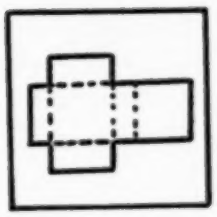

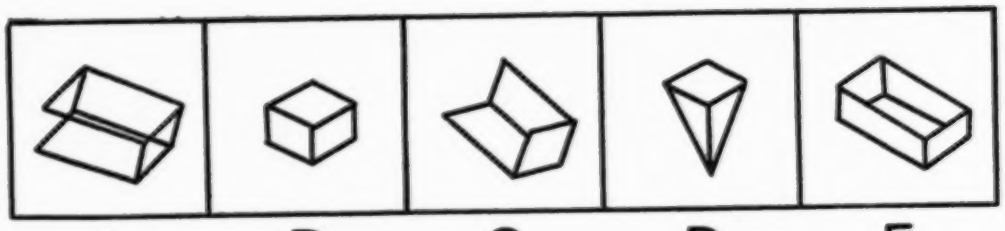

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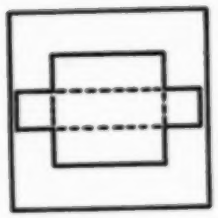

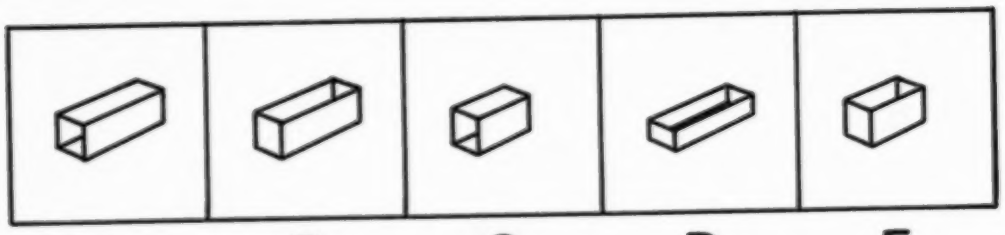

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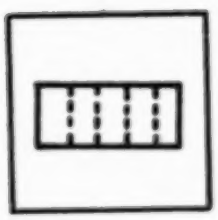

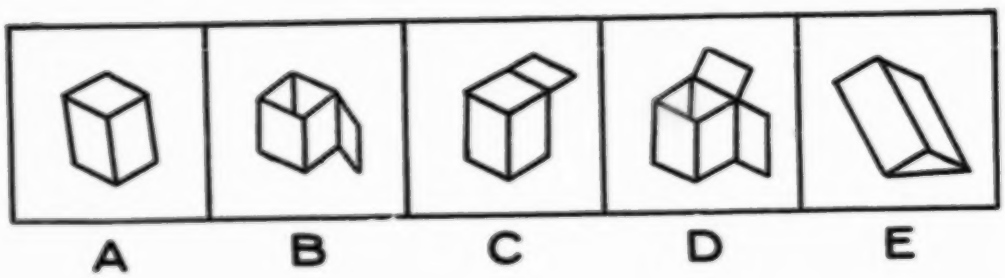

KEY

1. C
2. A
3. C
4. C
5. B
6. C
7. D
8. B
9. B
10. B

This is an experimental booklet intended to help young people learn basic principles and concepts of mechanics and technology by means of a series of aptitude training exercises. The exercises are similar to aptitude tests except that an explanation is provided of the underlying principle governing a particular class of items, as well as the correct answer.

This booklet is part of the curriculum and materials for teaching basic vocational talents being prepared under Contract OE-5-85-023 with the United States Office of Education.

Comments and suggestions will be appreciated. Address all correspondence to:

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Name _____
First Middle Last

Grade _____

Teacher _____

School _____

City _____